Additional Dissipation Mechanism of the First Sound in the Development of Quantum Turbulence

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We present the data of experimental investigations of the sound waves radiated by the vibrating quartz tuning fork immersed in He II. Measurements were carried out at a saturated vapor pressure in temperature range from 0.1 K to 2.5 K. Amplitude of the sound waves emitted by a quartz tuning fork, was determined using a piezoelectric receiver sound, depending on the velocity of vibrations at different temperatures. It is shown that, for laminar flow of He II, the emission amplitude of the sound wave is proportional to the velocity fluctuations. Increasing the velocity of vibrations leads to the development of quantum turbulence, recorded with a quartz tuning fork. Under these conditions, besides the scattering of thermal excitations, there is an additional mechanism of dissipation of sound waves caused by scattering by quantized vortices. The amplitude of the fluctuations in the wave of sound is drastically reduced.